

What is claimed is:

1     1.     A fluorescent lamp comprising:  
2             a base;  
3             a first constituent tube that has a U-shaped discharge  
4     path and is disposed so that a first end and a second end thereof  
5     are positioned on the base side of the fluorescent lamp, and  
6     a turning portion thereof where the discharge path turns is  
7     positioned away from the base;  
8             a second constituent tube that has a U-shaped discharge  
9     path and is disposed so that a third end and a fourth end thereof  
10    are positioned on the base side of the fluorescent lamp, and  
11    a turning portion thereof where the discharge path turns is  
12    positioned away from the base; and  
13             a bridge that connects a first area in a vicinity of the  
14    first end of the first constituent tube with a second area in  
15    a vicinity of the third end of the second constituent tube so  
16    as to join the two discharge paths, wherein  
17             distances between the first constituent tube and the  
18    second constituent tube gradually become smaller from the base  
19    side toward the turning portion side of the fluorescent lamp,  
20    and  
21              $D2/D1$  is within a range of 0.05 to 0.70 inclusive, where  
22     $D1$  is a distance between (a) a point closest to the base within

23 the first area and (b) a point closest to the base within the  
24 second area, and D2 is a shortest distance, on the turning portion  
25 side of the fluorescent lamp, between the first constituent tube  
26 and the second constituent tube.

1 2. The fluorescent lamp of Claim 1, wherein  
2 in each of the first constituent tube and the second  
3 constituent tube, a straight-line distance between the point  
4 at which D1 is measured and a point at which D2 is measured is  
5 within a range of 50 mm to 200 mm inclusive.

1 3. The fluorescent lamp of Claim 1, wherein  
2 a first imaginary line and a second imaginary line cross  
3 at an angle that is within a range of 0.4 to 3.0 degrees inclusive,  
4 where the first imaginary line is a straight line that connects  
5 two points in the first constituent tube at which D1 and D2 are  
6 measured respectively, and the second imaginary line is a  
7 straight line that connects two points in the second constituent  
8 tube at which D1 and D2 are measured respectively.

1 4. The fluorescent lamp of Claim 1, wherein  
2 metal mercury vapor is enclosed in the joined discharge  
3 paths, and  
4 a coldest-point control method is used to control a vapor

5 pressure in the joined discharge paths.

1 5. The fluorescent lamp of Claim 1, wherein  
2 the first and second ends of the first constituent tube  
3 and the third and fourth ends of the second constituent tube  
4 are at least partially cased inside the base.

1 6. A fluorescent lamp comprising:

2 a base;

3 a first constituent tube that has a U-shaped discharge  
4 path and is disposed on the base so that a first end and a second  
5 end thereof are positioned on the base side of the fluorescent  
6 lamp, and a turning portion thereof where the discharge path  
7 turns is positioned away from the base;

8 a second constituent tube that has a U-shaped discharge  
9 path and is disposed on the base so that a third end and a fourth  
10 end thereof are positioned on the base side of the fluorescent  
11 lamp, and a turning portion thereof where the discharge path  
12 turns is positioned away from the base; and

13 a bridge that connects a first area in a vicinity of the  
14 first end of the first constituent tube with a second area in  
15 a vicinity of the third end of the second constituent tube so  
16 as to join the discharge paths, wherein

17 distances between the first constituent tube and the

18 second constituent tube gradually become smaller from the base  
19 side toward the turning portion side of the fluorescent lamp,  
20 and

21 external surfaces of the first constituent tube and the  
22 second constituent tube are in contact with each other on the  
23 turning portion side of the fluorescent lamp.

1 7. A fluorescent lamp comprising:

2 a base;

3 a first constituent tube that (i) is made up of at least  
4 a first straight tube, a second straight tube, and a first bridge,  
5 both ends of the first straight tube and both ends of the second  
6 straight tube being closed, and the first bridge connecting an  
7 area in a vicinity of one of the ends of the first straight tube  
8 with an area in a vicinity of one of the ends of the second straight  
9 tube so as to form a U-shaped discharge path, and (ii) is disposed  
10 on the base so that unconnected ends of the first and second  
11 straight tubes are positioned on the base side of the fluorescent  
12 lamp, and the areas connected by the first bridge are positioned  
13 away from the base;

14 a second constituent tube that (i) is made up of at least  
15 a third straight tube, a fourth straight tube, and a second bridge,  
16 both ends of the third straight tube and both ends of the fourth  
17 straight tube being closed, and the second bridge connecting

18 an area in a vicinity of one of the ends of the third straight  
19 tube with an area in a vicinity of one of the ends of the fourth  
20 straight tube so as to form a U-shaped discharge path, and (ii)  
21 is disposed on the base so that unconnected ends of the third  
22 and fourth straight tubes are positioned on the base side of  
23 the fluorescent lamp, and the areas connected by the second bridge  
24 are positioned away from the base; and

25 an inter-constituent bridge that connects a first area  
26 in the first constituent tube on the base side of the fluorescent  
27 lamp with a second area in the second constituent tube on the  
28 base side of the fluorescent lamp so as to join the two U-shaped  
29 discharge paths, wherein

30 distances between the first constituent tube and the  
31 second constituent tube gradually become smaller from the base  
32 side toward the first and second bridge side of the fluorescent  
33 lamp, and

34  $D2/D1$  is within a range of 0.05 to 0.70 inclusive, where  
35  $D1$  is a distance between (a) a point closest to the base within  
36 the first area and (b) a point closest to the base within the  
37 second area, and  $D2$  is a shortest distance, on the first and  
38 second bridge side of the fluorescent lamp, between the first  
39 constituent tube and the second constituent tube.

1 8. The fluorescent lamp of Claim 7, wherein

2           a first imaginary line and a second imaginary line cross  
3   at an angle that is within a range of 0.4 to 3.0 degrees inclusive,  
4   where the first imaginary line is a straight line that connects  
5   two points in the first constituent tube at which D1 and D2 are  
6   measured respectively, and the second imaginary line is a  
7   straight line that connects two points in the second constituent  
8   tube at which D1 and D2 are measured respectively.

1   9.       A fluorescent lamp comprising:

2           a base;

3           a first constituent tube that (i) is made up of at least  
4   a first straight tube, a second straight tube, and a first bridge,  
5   both ends of the first straight tube and both ends of the second  
6   straight tube being closed, and the first bridge connecting an  
7   area in a vicinity of one of the ends of the first straight tube  
8   with an area in a vicinity of one of the ends of the second straight  
9   tube so as to form a U-shaped discharge path, and (ii) is disposed  
10   on the base so that unconnected ends of the first and the second  
11   straight tubes are positioned on the base side of the fluorescent  
12   lamp, and the areas connected by the first bridge are positioned  
13   away from the base;

14          a second constituent tube that (i) is made up of at least  
15   a third straight tube, a fourth straight tube, and a second bridge,  
16   both ends of the third straight tube and both ends of the fourth

17 straight tube being closed, and the second bridge connecting  
18 an area in a vicinity of one of the ends of the third straight  
19 tube with an area in a vicinity of one of the ends of the fourth  
20 straight tube so as to form a U-shaped discharge path, and (ii)  
21 is disposed on the base so that unconnected ends of the third  
22 and the fourth straight tubes are positioned on the base side  
23 of the fluorescent lamp, and the areas connected by the second  
24 bridge are positioned away from the base; and

25 an inter-constituent bridge that connects a first area in  
26 the first constituent tube on the base side of the fluorescent  
27 lamp with a second area in the second constituent tube on the base  
28 side of the fluorescent lamp so as to join the two U-shaped discharge  
29 paths, wherein

30 distances between the first constituent tube and the  
31 second constituent tube gradually become smaller from the base  
32 side toward the first and second bridge side of the fluorescent  
33 lamp, and

34 external surfaces of the first constituent tube and the  
35 second constituent tube are in contact with each other on the  
36 first and second bridge side of the fluorescent lamp.

1 10. A manufacturing method of a fluorescent lamp, comprising:  
2 a hole opening step of opening holes, by melting with  
3 heat, each in an area in a vicinity of a first end of a first

4 constituent tube and in an area in a vicinity of a second end  
5 of a second constituent tube, the first and second constituent  
6 tubes each having a U-shaped discharge path;

7 a joining step of joining, after the hole opening step  
8 is performed, a first melted area formed around the hole in the  
9 first constituent tube with a second melted area formed around  
10 the hole in the second constituent tube;

11 a distance adjusting step of adjusting D1 and D2 so that  
12  $D2/D1$  is within a range of 0.05 to 0.70 inclusive, where D1 is  
13 a distance between the first melted area in the first constituent  
14 tube and the second melted area in the second constituent tube,  
15 and D2 is a shortest distance, on a turning portion side of the  
16 fluorescent lamp, between the first constituent tube and the  
17 constituent tube, the turning portion being where each U-shaped  
18 discharge path turns; and

19 a holding step of holding, after the distance adjusting  
20 step is performed, the first and second constituent tubes until  
21 the first and second melted areas have a temperature that is  
22 equal to or colder than a strain point of a glass material of  
23 which the constituent tubes are made.

1 11. The manufacturing method of a fluorescent lamp of Claim  
2 10, wherein

3 in the distance adjusting step, (i) a first spacer whose



4 thickness is substantially equal to D1 is inserted between the  
5 first constituent tube and the second constituent tube at a point  
6 where D1 is measured, and (ii) a second spacer whose thickness  
7 is substantially equal to D1 is inserted between the first  
8 constituent tube and the second constituent tube at a point where  
9 D2 is measured.

1 12. The manufacturing method of a fluorescent lamp of Claim  
2 11, wherein  
3 the first spacer and the second spacer are each made of  
4 either copper or a copper alloy.